

WATER MAIN RESTRAINT

Minimum Restrained Lengths (in feet) back from both sides of fitting

Fitting type/nominal size	4"	6"	8"	10"	12"	16"
90 Degree Bend	17	25	32	38	45	59
45 Degree Bend	7	10	13	16	19	24
22.5 Degree Bend	3	5	6	8	9	12
11.25 Degree Bend	2	2	3	4	4	6
Dead End	39	55	73	87	103	134
Top Side Vertical Offset * (45 Degree)	16	23	30	36	43	55
Bottom Side Vertical Offset * (45 Degree)	4	6	8	10	11	15
Tee Run X Branch ** 6' by	1	17				
Tee Run X Branch ** 8' by	1	5	34			
Tee Run X Branch ** 10' by	1	1	24	49		
Tee Run X Branch ** 12' by	1	1	15	41	65	
Tee Run X Branch ** 16' by	1	1	1	26	52	95
Reducer *** 6' by	28					
Reducer *** 8' by	52	30				
Reducer *** 10' by	71	54	29			
Reducer *** 12' by	90	75	55	51		
Reducer *** 16' by	123	113	97	94	54	
* Vertical offset with MINIMUM 10' of solid pipe between upper and lower bend.						
** Tee with MINIMUM 10' solid pipe on both sides of run. Number indicates length of branch to be restrained.						
*** Length back from Large Eng of Reducer.						

CITY OF ST. CHARLES